Section 905. STEEL REINFORCEMENT

905.01 General Requirements. This specification covers steel reinforcement for use in concrete structures and pavements.

Source of supply shall be according to subsection 105.01.

905.02 Testing. Testing will be done according to ASTM A 370 or E 8 and the ASTM specification applicable to the material referred to herein.

When requested, the Contractor shall furnish the Engineer with two copies of the chemical analysis of reinforcing bars, as specified in the applicable ASTM specification.

905.03 Bar Reinforcement for Structures. Bar reinforcement for structures shall be deformed bars meeting the requirements of ASTM A 706 or the requirements for Grade 60 steel bars of ASTM A 615, A 616, or A 617, except as follows:

Unless otherwise specified, spiral reinforcement shall meet the requirements for plain or deformed Grade 40 steel bars of ASTM A 615 or A 617 or the requirements for cold-drawn wire of ASTM A 82.

Bar reinforcement for prestressed concrete beams meeting the requirements for Grade 40 steel bars of ASTM A 615 or A 617 or Grade 60 steel bars of ASTM A 616 will be permitted.

A. **Bending.** Bent bar reinforcement shall be cold shop bent to the shapes shown on the plans. Bends shall be made according to the following requirements. Any field bending shall be done cold as specified herein. Any heat bending will be cause for rejection.

   The diameter of a bar bend, measured on the inside of the bar, shall not be less than those specified in Table 905-1.

Table 905-1 Minimum Diameters of Bend

ASTM Bar Designation No.	Inside Diameter of Bend
No. 3 through 8	6 bar diameters
No. 9 through 11	8 bar diameters
No. 14 and 18	10 bar diameters
Stirrups and Ties No. 3 through 5	4 bar diameters

   Tolerances in cutting and bending bars are as established in the CRSI Code of Standard Practice and the *ACI Detailing Manual*.

B. **Bundling and Tagging.** Bar reinforcement shall be shipped in standard bundles, tagged and marked according to the CRSI Code of Standard Practice.

C. **Epoxy Coating.** Steel reinforcement required to be epoxy coated shall be coated according to ASTM D 3963-99, with the following exceptions and additions:

1. The coating material shall be selected from the Qualified Products List.

2. Testing by the Department on samples obtained for determining thickness of coating, adhesion of coating, and holidays may be conducted either at the coating applicator's plant or at the laboratory. A sufficient quantity of bars over plan quantity shall be coated to permit splicing to replace bars removed for test samples.

3. The coating applicator shall furnish written certification that the coated reinforcing bars were cleaned, coated, and tested according to ASTM D 3963-99.

4. Bars may be coated before or after bending. Any damage to the coating shall be repaired according to section 706.

D. **Bar Chairs and Wire Ties for Epoxy Coated Steel Reinforcement**. The bar chairs and wire ties required for placing and fastening steel reinforcement shall meet the following:

1. Bar chairs shall be plastic coated wire, epoxy coated wire, or plastic.

2. Wire ties shall be plastic coated wire, epoxy coated wire, or molded plastic clips.

3. Tie-down wires shall be plastic coated.

905.04 Bar Reinforcement for Pavements. Bar reinforcement for pavement tie bars and bars for use as dowels for load transfer in pavement expansion joints and contraction joints shall meet the requirements specified in section 914.

905.05 Dowels and Bar Reinforcement for Curbing, Glare Screen, Concrete Barriers, and Filler Walls. Dowels and bar reinforcement for curbing, glare screen, concrete barriers, and the filler walls between bridge piers shall be deformed steel bars meeting the requirements of ASTM A 706 or the requirements for Grades 40, 50, or 60 of ASTM A 615, A 616, or A 617 as applicable.

905.06 Steel Welded Wire Fabric.

A. Fabric for prestressed concrete shall be deformed wire and conform to ASTM A 497.

B. Fabric for concrete pavement reinforcement shall conform to ASTM A 185 and shall be fabricated as shown on the plans.

905.07 Strand for Prestressed Concrete. Strand shall be 0.500 inch nominal diameter with a cross-sectional area of 0.153 square inches, or 0.600 nominal diameter with a cross-sectional area of 0.217 square inches meeting ASTM A 416, Grade 1860, Low Relaxation Strand as specified in the plans.

Each reel or pack shall be identified by number and shall be accompanied by a Type A certification including a load-elongation curve to at least one percent elongation.

All prestress strand shall be protected from physical damage, rust, and other contaminants.

905.08 Tendons for Lateral Post Tensioning of Box Beams. Tendons shall meet the requirements for Grade 1860 steel strand of ASTM A 416 or for high-strength steel bars of ASTM A 722.

If bars are selected, the Contractor is cautioned to ascertain the length of bar required due to variations which can occur because of the tolerances permitted in manufacturing and placing precast concrete box beams.